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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,041	07/10/2007	Yoshitsugu Morita	DC10032PCT (71,051-071)	3380
27305 7590 03/17/2010 HOWARD & HOWARD ATTORNEYS PLLC 450 West Fourth Street Royal Oak, MI 48067			EXAMINER HUDA, SAEED M	
			ART UNIT 1791	PAPER NUMBER
			MAIL DATE 03/17/2010	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/599,041	Applicant(s) MORITA ET AL.	
	Examiner SAEED M. HUDA	Art Unit 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The response filed on 12/22/2009 has been fully considered and entered into the record. Claims 1-10 are pending in the application. Claim 10 is withdrawn. Claims 1-9 are ready for examination.
2. The rejection for claims 1-9 under 35 USC § 112 is withdrawn.

Election/Restrictions

3. Applicant's election with traverse of claims 1-9 and in the reply filed on 12/22/2009 is acknowledged. The traversal is on the ground(s) that the basis for the restriction requirement is not clearly presented. This is not found persuasive because a clear showing of the reasoning behind the restriction has been presented.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

- Group I, claim(s) 1-9, drawn to a method of manufacturing a semiconductor device sealed in a cured silicone body.
- Group II, claim(s) 10, drawn to a semiconductor device.

4. The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The technical feature common to Groups I-II is the invention related to a semiconductor device sealed in a cured silicone body by placing an unsealed semiconductor device into a mold and subjecting a curable liquid silicone composition that fills the spaces between the mold and the unsealed semiconductor device to compression molding under a predetermined molding temperature, wherein said curable liquid silicone composition has viscosity of 90 Pas or less at room temperature, and wherein a time interval from the moment directly after measurement of a torque with a curometer at the

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molding temperature to the moment when the torque reached 1 kgf-cm is not less than 1 min., while the time interval during which the torque grows from 1 kgf-cm to 5 kgf-cm is not more than 1 min. This cannot be a special technical feature under PCT Rule 13.2, because the element is known in the prior art.

Miyajima et al. (US 2002/0015748 A1) teach a method of manufacturing a semiconductor device sealed in a cured resin body by placing an unsealed semiconductor device into a mold and subjecting a curable resin composition that fills the spaces between the mold and the unsealed semiconductor device to compression molding under a predetermined molding temperature (abstract, [0001], figure 1). Miyajima et al. fail to teach the use of which is a liquid silicon composition, wherein the viscosity at room temperature is of 90 Pa·s or less and a time interval from the moment directly after measurement of a torque with a curometer at the molding temperature to the moment when the torque reached 1 kgf-cm is not less than 1 min., while the time interval during which the torque grows from 1 kgf-cm to 5 kgf-cm is not more than 1 min.

Lee et al. (EP-A-0 99798) teach a compression set of elastomeric silicone compositions used in cured injection moldable compositions (abstract). Lee et al. go on to teach that having a viscosity of less than 90 Pa·s at room temperature (paragraph 66 and examples 1-2) and suitable for the encapsulation of chip scale packages (paragraph 19). Lee et al. fails to explicitly teach the claimed torques and times; however, it would have been obvious to one having ordinary skill in the art at the time of the invention to have used the claimed torques and times in that this would satisfy the need of having a molding material which maintains this low viscosity for the time required to fill all the voids and then can be rapidly cured. It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the invention of Miyajima et al. using the invention of Lee et al. because this will yield desirable properties such as low alpha particle emissions, very good moisture resistance, excellent electrical insulation, excellent thermal stability, and very high ionic purity ([0002]). Furthermore, the product recited in claim 10 appears to be anticipated by the semiconductor sealed by the silicone taught by Lee et al.

Accordingly, the special technical feature linking the two inventions does not provide a contribution over the prior art, and no single general inventive concept exists. Therefore, restriction is appropriate.

The requirement is still deemed proper and is therefore made FINAL

Response to Arguments

5. Applicant's arguments filed 12/22/2009 have been fully considered but they are not persuasive.

Applicant states alleges that there is no basis for the Examiner's position that the torques and times claimed in claim 1 would have been obvious to one having ordinary skill in the art at the time of the invention. Applicant provides the standards the Examiner must apply in performing an obviousness analysis. Applicant states that the question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art (2) any differences between the claimed subject matter and the prior art (3) the level of skill in the art (4) secondary considerations and that when making a determination of obviousness, this should be based on what a person having ordinary skill would have known at the time of the invention and on what a such person would have reasonably expected to have been able to do in view of that knowledge. The Examiner has provided proper secondary considerations to make the determination of obviousness.

Applicant goes on to state that Lee et al. does not teach use of the silicone composition taught therein for compression molding techniques to encapsulate semiconductors; however, this portion of the claim limitation is taught by the primary reference Miyajima (see rejection below). Applicant goes on to state that that Lee et al. fails to address the problems relative to minimizing warping, preventing void formation, and a stated range of curing temperatures. Though, such goals may be present in the disclosure of the Application, they are not claimed and thus need not be considered by the Examiner.

Applicant goes on to state that the Examiner's rationale for obviousness of the claimed torques and times in view of the disclosure of Lee et al. would favor maximized

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processing temperatures to lower viscosity to promote flow of silicone compositions to fill all the voids and to further promote curing. However, there are no explicit molding temperatures found in the claims.

Applicant then goes on to emphasize the importance of the time related to the torque and indicates that the balance between the torque is not recognized in the prior art. Applicant states that the torque and time have specified values a balance between the two is present and show table 1 as evidence of this balance. Though it is claimed that the torque and time must be of specified values, a balance between the two is not specifically claimed.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claim is indefinite since it does not define what torque that is measured.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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9. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyajima et al. (US 2002/0015748 A1) in view of Lee et al. (EP-A-0 99798).

a. Regarding claim 1, Miyajima et al. teach a method of manufacturing a semiconductor device sealed in a cured resin body by placing an unsealed semiconductor device into a mold and subjecting a curable resin composition that fills the spaces between the mold and the unsealed semiconductor device to compression molding under a predetermined molding temperature (abstract, [0001], figure 1). Miyajima et al. fail to teach the use of which is a liquid silicon composition, wherein the viscosity at room temperature is of 90 Pa·s or less and a time interval from the moment directly after measurement of a torque with a curometer at the molding temperature to the moment when the torque reached 1 kgf·cm is not less than 1 min., while the time interval during which the torque grows from 1 kgf·cm to 5 kgf·cm is not more than 1 min.

Lee et al. teach a compression set of elastomeric silicone compositions used in cured injection moldable compositions (abstract). Lee et al. go on to teach that having a viscosity of less than 90 Pa·s at room temperature (paragraph 66 and examples 1-2) and suitable for the encapsulation of chip scale packages (paragraph 19). Lee et al. fails to explicitly teach the claimed torques and times; however, the time required for the torque to reach 1 kgf·cm and the time required for the torque to grow from 1 kgf·cm to 5 kgf·cm are a result of several things such as the rate of crosslinking of the polymer and whether the material is a strain-rate sensitive or shear thinning type material. Therefore this is

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a result effective variable. Consequently, since the combining references teach a method for sealing a semiconductor device using a same silicone material and same encapsulating molding apparatus, it would have been obvious to one having ordinary skill in the art at the time of the invention to have conducted routine experimentation to determine/measure the rate of crosslinking and the strain-rate sensitivity of the material in order to obtain time it requires the torque to grow from reach 1 kgf·cm and to go from 1 kgf·cm to 5 kgf·cm.

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the invention of Miyajima et al. using the invention of Lee et al. because this will yield desirable properties such as low alpha particle emissions, very good moisture resistance, excellent electrical insulation, excellent thermal stability, and very high ionic purity ([0002]).

b. Regarding claims 2-3, Miyajima et al. in view of Lee et al. teach that the silicone composition is a hydrosilylation-curable liquid silicone composition (Lee et al. paragraphs 57-58) and that the cured silicone has a modulus of elasticity of 1 GPa or less (Lee et al. table 1);

c. Regarding claim 4, Miyajima et al. teach clamping the semiconductor device between the upper mold and the lower mold, and compression molding the adopted resin (figure 2).

d. Regarding claim 5, Miyajima et al. teach that the obtained sealed assembly is cut into separate sealed semiconductor devices (figure 5).

- e. Regarding claims 6-7, it is a common practice to mount chip on a printed circuit board, electrically connecting the chips to the printed circuit board via bonding wires, and sealing the chips and the connections with a cured resin (figure 13).
- f. Regarding claims 8-9, Miyajima et al. teach the use of release films (paragraph 50) held against the inner surface of the mold by air suction (paragraph 12).

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAEED M. HUDA whose telephone number is (571)270-5514. The examiner can normally be reached on 8:00 - 5:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steve Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KHANH NGUYEN/
Primary Examiner, Art Unit 1791

/SAEED M. HUDA/
Examiner, Art Unit 1791